PROBLEMS ASSOCIATED WITH PRODUCING QUALITY MILK

by

James J. Jezeski
Extension Dairy Technologist
University of Florida
Gainesville, Florida

As a newcomer to Florida dairying, it would be presumptuous of me to attempt to speak with authority about the quality problems of milk produced in Florida - particularly when most of Florida's milk satisfies the regulatory agencies, the processors, and most importantly the consumers. The large number of repeating quality awards presented at the banquet is evidence of the performance of typical Florida dairymen and a reflection of the basic high quality of Florida milk. Consequently, I prefer this to be a "get acquainted" session in which you learn something more about me; and as the result of contacts I make at this meeting, I get to put more names, faces, and voices together and also begin to understand about your production systems, ways of doing business and your problems. So, I will just review those problems that are currently of concern to dairymen whether located in Florida or almost anywhere else in the continental United States. However, in the few short months I have been getting around the state, several "tender spots" have become apparent and I'd like to say a word about them.

1. Composition

Because of the basic lack of roughage, Florida milk tends to be lower in fat and solids than milk from farther north where the cows get more silage and hay. The low acidity levels (0.14-0.15%) commonly encountered (and, thus, usually expected at delivery to the processing plant) are generally due to the low solids, at least in part. If the right set of circumstances occurs, the fat can increase and the solids not fat along with it; as a result, the acidity can go to 0.16-0.18% without there being cause for concern particularly if the fat is in the neighborhood of 4.0% or above. The amount and type of roughage will markedly influence composition as will certain other factors; and changes in composition can affect titratable acidity. The pH and bacterial count should indicate whether the increased acidity is the result of bacterial activity or some other controllable factor.

2. Freezing point as an indication of added water

The average freezing point of milk used as a regulatory standard is generally arrived at as the result of local testing experience; and based on the figures obtained by the Dairy Division, State of Florida, serious problems are infrequently encountered; but there are producers who do show borderline results from time to time.

There are good opportunities for added water to get into milk particularly with the size of milking equipment used in the larger Florida dairy herds. The dairyman has to be vigilant about adequately draining
the milking system, bulk tank, and associated piping after cleaning and sanitizing to get rid of not only the water which contributes to a higher freezing point, but also the detergent and sanitizer residuals which contribute to positive inhibitor tests and may interfere with good culture activity in the manufacture of cultured products. We will discuss more about these chemical inhibitors later.

3. Off-flavor problems in raw milk

As milk is received from the dairy farm, there can be a variety of flavors present: from the feed, from pasture or loafing areas (weeds), from the sanitizing and/or cleaning chemicals used if the equipment is not well rinsed and/or drained, and developed flavors such as rancidity. This latter can be related to late lactation and marginal nutrition in the dairy cow as well as to equipment factors (starved pumps and defective level controls, poorly maintained milking systems with air leaks: all of which permit entrance of large amounts of air into the milk and subsequent excessive foaming); and some milking management factors such as teat cups on too long and teat cups dropping off - these again adding to excessive air in the milk. It is interesting to note that several of the milking management practices which are recommended in mastitis control also are suggested to minimize lipase activation during milking.

4. Antibiotics and drug inhibitors from disease treatment

Florida milk supplies are well monitored for the presence of antibiotics and other animal drug inhibitors. The percentage of positive tests obtained is very low among all of the samples tested from Florida dairymen which indicates a general awareness of the problem and conscientious control over milk from treated cows. The consequences of the very infrequent slip-up are so very serious here in Florida because of the size of the herds which results in few herds per pick up tanker; and in the smaller plants, a very few large producers constitute the entire processing supply for a given day.

We have just heard from Dr. Clarke of USDA on the STOP program for detecting antibiotics in meat carcasses. This rapid screening procedure will provide a similar quick screening for the presence of antibiotics in carcasses as is done in milk. This program is of current concern to the dairy farmer as it relates to his marketing of cull cows particularly those that he wants to move quickly.

But the dairyman has an even greater concern on a day to day basis about the presence of antibiotics in his milk. While the FDA looks on all residues in foods as contamination, the FDA does consider antibiotic residues in milk as particularly significant from a public health point of view. The presence of minute amounts of penicillin in milk can trigger serious allergy symptoms in those who are sensitized to the penicillin. Furthermore, the dairy processor who is manufacturing culture milk products will be seriously disadvantaged if cultures will not be active in milk containing antibiotics or other bacterial inhibitors.

The procedure generally used in the screening of farm milk samples for antibiotics is somewhat less sensitive than the methods used for detecting antibiotics in commingled milks and processed fluid products. In turn, the latter are less sensitive than those used for detecting antibiotics in dry milks. Thus, there is a greater burden on the dry milk
processor than on the fluid milk processor or the dairy farmer in providing products that show no detectable antibiotic residues.

The practices on the dairy farm which provide a hazard related to antibiotic residuals are those used principally in control of mastitis. Administration of antibiotics and other drugs to lactating dairy cows sets up the critical conditions. Strict adherence to the withholding times is absolutely necessary and that means not only on each quarter treated but for each cow treated regardless of the number of quarters treated per cow.

5. Bacteria standards

As regards bacteria, the average Florida dairymen does not seem to have much difficulty in meeting bacterial count standards; although there are occasionally situations in which a poor job of cleaning and sanitizing is done or there is an equipment or power failure so that cooling is delayed or not at all properly carried out. As is the case wherever cows are milked, the necessity to conscientiously do the little things and not just go through the motions is the secret of success in keeping those counts low. The consequences of a slip-up or an accident or some event occurring over which we have no control may be very serious and it's better to admit the problem rather than cover it up because at least in that way a whole tanker load of milk may avoid being spoiled.

Some of the consequences of a bad (high bacterial count) tank of milk may be off flavor and/or poor shelf life of the processed product. High bacterial counts and the development of off flavors can take place even in properly pasteurized milk that has been adequately stored in the cold as the result of post pasteurization contamination picked up from milk contact surfaces downstream from the pasteurizer. This is primarily a processing plant sanitation problem.

But, a high bacterial count raw milk off a farm where there has been a cleaning-sanitizing "boo-boo" or a power failure even though a very high percentage of the bacteria are killed by pasteurization can have a short shelf life and develop some off flavors relatively quickly due to the action of enzymes which are not destroyed by pasteurization even though the bacteria themselves have been killed. This kind of spoilage often results in characteristic bitter flavors and the "bitty" defect in high fat products - the latter an appearance defect in which the product looks lumpy or curdled.

Another kind of shelf life problem is related to the pasteurization survival of a particular group of bacteria known as spore formers and some of which are capable of growing at refrigerated product storage temperatures. These organisms are known in dairy research literature as psychrotrophic spore formers. The results of this slow growth are bitter flavors and sweet curdling. The latter is evidenced by plaques or "blisters" of coagulated milk adhering to the insides of milk containers toward the end of the designated shelf-life period. In the more advanced stages of sweet curdling the bottom portion of the container may be covered or filled with a very soft custard-like curd. Depending on the numbers of these organisms present originally and some factors not yet completely understood, the defect can be observed in as little as seven days but more often takes longer to develop. Consequently, because the organism may be present in the raw milk before pasteurization and does survive pasteurization, this could be a farm
quality problem. Modern dairy processing techniques which utilize higher product pasteurization temperatures may intensify rather than decrease the frequency of this problem.

6. Extraneous matter and chemical residuals

We have already mentioned something about residuals in milk as it is delivered from the farm. They may come from the feed of the cow, from the cow's environment, from drug treatments, from milking equipment and operations. Any chemicals or extraneous materials are in this category. The most common items are: sediment, added water, cleaning and sanitizing chemicals, antibiotics and other drugs, mycotoxins and iodine. FDA regulations consider extraneous matter and enough water to raise the freezing point above a certain standard as adulterants. Control of these, extraneous matter and added water, is relatively easily achieved by close control and monitoring of the cow side and milk house sanitation procedures. Sediment arises from dirty teats and udders and by being picked up in and by the inflations during milking. The control of residues from cleaning and sanitizing operations depends on close supervision of milking parlor and milkhouse clean up to insure that all equipment is adequately drained before the next milk contact period. Antibiotic and drug residues can be controlled by conscientious adherence to withholding times. It's like playing Russian roulette and practicing false economy to put milk from antibiotic treated cows into the bulk tank.

Mycotoxins are somewhat different. They find their way into milk via the feed. The growth of certain types of molds on grain and other feed ingredients can result in the production of these toxic substances which can cause lethal reactions in certain animals and be transmitted from dairy cows. The obvious control is, of course, elimination of feeds containing mycotoxins. Their detection in feedstuffs is not a simple short routine test; it involves requiring sophisticated equipment, and it is relatively expensive. The southeastern states have had some problems with mycotoxins in dairy feeds; residuals beyond tolerable regulatory limits have been detected and FDA continues to be extremely concerned about the problem. The State of Florida Department of Agriculture, Dairy Division is to be commended for the quiet effective efforts which have dealt with the problem adequately.

The presence of high iodine intakes in today's "Market Basket" food survey by FDA is cause for continuing concern by that agency. Milk continues to be a very high occasional source of iodine in the diet. And, the extremely high levels detected in milk come from orally administered drugs and other compounds rather than teat dips or other sanitation chemicals. Further research is being undertaken to establish the predominant sources of iodine in bovine milk and some proposal(s) addressing the control of high iodine levels in milk should (or are scheduled to) appear in the near future. This type of proposal and the problem addressed will have some substantial impacts on dairymen in terms of limitations of iodine containing compounds or formulations used as drugs and/or feed supplements.

7. Control of mastitis

On several occasions earlier, reference has been made concerning certain issues relating to the problem of mastitis. Mastitis with its destructive effects on milk production is largely an economic problem to the dairyman but it also complicates the processor's life because mastitis milk is
low in solids, has poor stability in processing, provides lower yields in cultured product manufacture, and seems implicated in some rancidity incidents. By and large, the Florida dairyman seems quite knowledgable in the technology of mastitis control which is focused on close supervision and management. The areas where these efforts are focused in a mastitis control program include cow side hygiene (sanitizer solution for washing udders and preparing the cows for milk let-down and the use of post milking teat dips); milking management factors (proper installation and maintenance of milking equipment, good prepping of cows + fast milking) and finally dry cow therapy.

There is no quick and easy way to minimize mastitis. There are no magic drugs, vaccines, or other treatments to provide immediate and complete control. Maximum control is achieved by a constant application of preventive health practices involving two main principles: 1) minimizing the number of mastitis pathogens in the area of the teat end opening to prevent entrance of the organism into the udder, 2) as much as possible, avoiding exerting any stress on the mammary gland so that any organism gaining entrance to the mammary gland does not have the opportunity to grow and set up an infection. The cow's environment does not lend itself readily to control of microorganisms but we must do the best we can with good sanitation practices both at cow side and directed at environmental contamination and the management factors including equipment maintenance and approved milking practices. These are exercises in conscientious adherence to detail and thus are people related and people dependent. To get these program details properly and consistently applied requires awareness, knowledge and dedication at the top management level which then must carry down into close supervision of the milking personnel who get these critical things done properly on a day to day basis.

The National Mastitis Council (NMC) is a non-profit scientific and educational organization founded to serve the dairy and related industries through improved control of the major disease problem of the dairy cow, mastitis. There are 650 individual members and 200 sustaining memberships held by various organizations and industry groups. The Council holds a regional summer meeting and an annual meeting in February at which educational papers are presented and Council business is transacted. Educational materials such as Current Concepts of Bovine Mastitis and Microbiological Procedures for Diagnosis of Mastitis are published by the Council. There are sixteen committees within the Council sponsoring educational and research activities relating to mastitis.

Florida dairymen and associated industry and regulatory people presently are not widely supporting the National Mastitis Council. There are this year only fourteen individual members and one sustaining member from the State of Florida. Greater contact with the National Mastitis and Council its programs would be of benefit to Florida dairymen. The summer meeting of the NMC will be held this year on August 16, 1979 at the Sheraton Twin Towers in Orlando, Florida. The program will last from 9:00 a.m. to about 4:00 p.m. and the afternoon program will include a panel of Florida dairy industry people who will discuss Florida programs, problems, and concerns related to mastitis control. I would urge that you take advantage of this opportunity to learn more about the activities of NMC.
In conclusion, some of my past experiences have included working with dairy farmers, producer group and dairy plant fieldmen, processors, and associated regulatory personnel on raw milk quality problems including control of mastitis and milking equipment sanitation. I will make every effort to become better informed on the Florida dairyman's individual problems and needs by attending as many producer meetings as possible and in one-on-one contacts in the field. And, accordingly, the opportunity to visit with each of you would be most welcome. Please get in touch with me if I can be of assistance in providing information or in helping out with any problem you may have.